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CHEMISTRY.

WM. G. MIXTER,

Yale University.

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Chemistry.—Course A.

Physics of Chemistry.

Fundamental conceptions, page 1.* Densities, 9. Crystallography, 12, as reading matter, unless models of crystalline forms are available. Temperature and heat, 24. Laws of gases, 33. Kinetic theory of gases, 34. Maxwell's definition of a molecule is: "A molecule is that minute portion of a substance which moves about as a whole, so that its parts, if it has any, do not part company during the motion of agitation of the gas." The determination of gas densities, 41, gives the relative masses, commonly called molecular weights, of gaseous molecules.

Chemistry.

Elements, atoms, atomic weights, 46. Hydrogen, 50. Exps., 6–15. In place of trough D, Fig. 52, a bowl or pan may be used. Preparation of granulated zinc, 210. Exp., 147.

Chlorine, 56. Molecules and reasons for the molecular formula H_2, 61. Exp. Place a thimbleful of black oxide of manganese and a tablespoonful of strong hydrochloric acid in a tumbler. Suspend in the tumbler pieces of moist pink calico, and printed paper and

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* The references are to "An Elementary Text-Book of Chemistry," Mixter: John Wiley & Sons, New York. Most of the experiments indicated in the scheme may be made with a moderate supply of chemicals and apparatus obtained from druggists.

paper with writing-ink and lead-pencil marks. Cover and set out of doors for a time.

Hydrochloric acid, 66. Exps. To a little common salt in a test-tube add strong sulphuric acid, and test escaping vapors with moist blue litmus paper. Heat concentrated hydrochloric acid in a test-tube. What escapes? Exps., 34, 35. Bromine, 70. Iodine, 71. Exps., 38, 43, 44, 45. Exp. Smear paper with starch paste containing a little potassium iodide, and expose to chlorine gas. Fluorine, 75. Exp., 48. Summary of the halogens, 77.

Valence, 80.

The first group, omitting cæsium and rubidium, 83.

Oxygen, 107. Exp., 60. A test-tube, if carefully heated, will answer in place of an ignition-tube. Exps., 61–64. Ozone, 110. Exps., 71, 72. Water, 113. Exp., 74. Hydrogen dioxide, 119. Exps., 79–81. For the last experiment illuminating gas will answer in place of hydrogen.

The oxides and hydroxides of the first group, omitting the compounds of gold and parts in small type, 137. Exps., 93–97, 99.

Sulphur, selenium, and tellurium, 144. Exps., 102–105, 107, 108. For experiment 105 drinking water will answer. Sulphides, 152. Exps., 110, 111.

Oxides and hydroxides of sulphur, 154. Exps., 116, 117, 119, 120.

Bases, acids, and salts, 162.

Constitution of sulphuric acid, 167. Sulphates of sodium, potassium, and copper, 172. Exps., 121, 122. Summary of sixth group, 192.

The second group, 195. Alkali-earth metals, 196. Calcium, 197. Exps., 128–133. Magnesium, 206. Zinc, 209. Mercury, 214.

The fifth group, 222. Nitrogen, 222. Ammonia, 223. Exp., 148. A small, strong bottle may be used in place of the cylinder of Fig. 78. Exps., 149–152. Ammonium chloride, 228. Exp., 157. Ammonium sulphate, 230. Constitution of ammonium salts, 231.

Oxides and hydroxides of nitrogen, 232, omitting aurous and auric nitrates, and also Exps. 159, 163, 166, 169. The atmosphere, 249.

Phosphorus, 252. Arsenic, 268. Antimony, 276. Bismuth, 281. Omit compounds of the last two metals. Summary of the fifth group, 288.

The third group, 291. Boric acid, 293. Exp., 184, *a* and *b*. Borax, 295. Aluminum, 296–303, and experiments. Summary of the third group.

The fourth group, 313. Carbon, 313. Exps., 192, 193, 196, 197. Compounds of carbon, 321. Exps., 201–208, 211–215. Silicon, 363. Silica, 366. Silicic acid, 367. Exp., 225. Tin, 378. Stannaus chloride, 380. Stannic chloride, 381. Lead, 385. Exp., 230. Summary of the fourth group, 392.

The eighth group, 394. Iron, 394. Exps., 232–234, 236, 237. Summary of the eighth group, 431.

The atomic theory, 435. The periodic law, 443.

Course B.

The work in this course is a continuation of that of Course A, with special reference to the theories of chemistry. The text-book is Remsen's Theoretical Chemistry.

The student is advised to read, in connection with the text-book work, the following :

The Historical Introduction and the General Principles of the Science in Roscoe and Schorlemmer's Treatise on Chemistry.

The Historical Introduction under the head of Chemistry, and the article on the Atom, both in the Encyclopædia Britannica.

Roscoe and Schorlemmer, the Encyclopædia, or Watt's Dictionary of Chemistry, may be consulted for more complete descriptions of compounds than found in text-books.

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